and rapid growth of the science of bacteriology, and the special study of yeasts and fermentation has been dignified by the name of zymotechnology. By "Protistenkunde" or protistology is denoted a wider field of study, embracing all Protista as its objects, and of which bacteriology and kindred sciences are but subordinate branches.

It is not surprising, therefore, that a journal has appeared which is to be devoted entirely to protistology. The *Archiv für Protistenkunde* will be welcomed by a wide circle of naturalists, and will find a place in every biological library. Edited by Dr. Fritz Schaudinn, who has himself pursued the study of Protozoa with such remarkable success, its high standard of excellence is practically guaranteed. The contents of the first number do not disappoint our expectations, while they show at the same time that the aim of the journal is to be scientific rather than practical. With contributions headed by names so well known as Hertwig, Bütschli, Brandt and others, the new journal makes a good start.

The first article is contributed by Prof. R. Hertwig, and is a very interesting discussion on Protozoa in relation to the cell-theory. To show the scope of his dissertation, it must suffice to quote his principal conclusions. He attempts "to develop a uniform conception of the cell, applicable alike to Protozoa and Metazoa," recognising that any such attempt does not rest at present on a very firm basis, but thinking it nevertheless more useful to formulate precise conclusions, which can be criticised, than to rest content with vague indications.

> "Three kinds of substances, characterised by the part they play in cell-life, must be assumed : (1) the achromatic substance ; (2) the chromatin ; (3) the nucleolar substance. These three substances show the following distribution in the cell of the Metazoa, and probably also in that of multicellular plants. The protoplasmic framework—leaving out of consideration the material filling the meshes or alveoli (Bütschli)—represents an intimate union of achromatic framework and chromatin, of which the latter is only separated out under special circumstances in small quantities, and then induces a heightened staining-capacity of the cell body. . . . The linin-framework of the nucleus consists only of achromatic substance, in which is deposited the chromatin, bound up with nucleolar substance and thereby organised. In this way arises the chromatic nuclear framework of authors. An excess of nucleolar substance forms the true nucleoli, which in the majority of cases are subsequently used up in the formation of chromosomes in karyokinesis, in the Metazoa just as in *Actinosphaerium*."

The first number contains five other articles besides that of Hertwig, amongst which may be noticed one by Bütschli on the structure of the Cyanophyceæ and Bacteriaceæ, a monograph of the Coccolithophoridæ by Lohmann, and a discussion by Doflein of the outlines of classification of the Protozoa. The last-named author divides the Protozoa into two main divisions : first the Plasmodroma, characterised by possessing organelles for locomotion

> "which can be easily recognised as protruded portions of the body-protoplasm, and which, moreover, in many cases can be extruded and withdrawn as required" ;

secondly the Ciliophora, in which the organs of locomotion, when present, are cilia. The Plasmodroma comprise the three classes Rhizopoda, Mastigophora and Sporozoa ; the Ciliophora comprise the Ciliata and Suctoria.

In conclusion, it is only necessary to add that the various memoirs are illustrated, where necessary, by lithographed plates of the degree of excellence to which one is accustomed in German zoological periodicals.

E. A. M.

AN ASSAYER'S HANDBOOK.

Assaying and Metallurgical Analysis for the use of Students, Chemists and Assayers. By E. L. Rhead and Prof. A. Humboldt Sexton, F.I.C., F.C.S. Pp. x + 431. (London : Longmans, Green and Co.) Price 10*s*. 6*d*. net.

THE differences between assaying and chemical analysis in the ordinary usage of the terms are perhaps not very precise. An effort was made some years back in America to apply the word "assaying" only to the estimation of some or all of the elements in a substance by means of dry reagents and heat, and the word "analysis" to all estimations by the use of reagents in aqueous solution. These definitions, however, have not met with much favour, and have little to recommend them. It would be better to limit "assaying" to the estimation of the valuable constituent or constituents of an ore or other substance, and to use "analysis" for the estimation of the other constituents and for all qualitative determinations. According to this view, a gold ore would be assayed for gold and silver, and the sulphur, copper, iron, &c., would be determined by analysis, while a copper ore would be assayed for copper, the sulphur in iron pyrites would be determined by assay, and so on. Messrs. Rhead and Sexton have in general followed this method, but there are difficulties in its adoption, and in any case an authoritative definition is required.

There are already many books on the subject, and although some of them are out of date, the need of a new one which does not follow any strikingly original and advantageous plan does not seem pressing. It may be presumed that the authors of the book under review have found difficulties in teaching their students with the aid of the older books, and after supplying their own wants have decided to offer their system to other teachers. The result is by no means displeasing. The plan of the book is excellent. The student or assayer can find what he wants without delay, and the description of the required process is always terse, usually accurate and in many instances sufficiently complete. The accuracy, however, is unfortunately by no means without exception, but the chief fault of the book is that in the effort to reduce its size terseness has been pushed to an extreme, and the working directions are often insufficient to enable the process in course of description to be properly carried out even by an assayer of some experience unless he has been previously taught what to do.

An example of the lack of accuracy occurs in the description of the iodide method of estimating copper, in the course of which on p. 79 the student is informed that

> "Cupric salts liberate iodine from potassium iodide. The liberated iodine may be estimated by means of a solution of potassium thiosulphate of known strength, sodium iodide and sodium tetrathionate being produced."

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If he is puzzled by the production of sodium salts from potassium thiosulphate, and turns to the fuller account on p. 85 for elucidation, he is confronted by the equation

$$2CuSO_4 + 4K = Cu_2I_2 + 2K_2SO_4 + 2I.$$

In the subsequent directions, moreover, no attempt is made to shorten calculation by the use of a normal standard solution or of one that will enable the percentage of copper to be read off from the burette. The student is told to "Dissolve [0·5 grm. copper] in 5 c.c. nitric acid and boil till all nitrous fumes are expelled," a dangerous piece of advice, and one that contains no hint of the practice now often preferred of getting rid of the nitric acid by means of sulphuric acid and so removing all chance of the disconcerting return of the blue colour. The dangers of terseness are also shown in the account of the estimation of lead as lead sulphate, on p. 64, where the directions are as follows:—

> "The solution is evaporated with sulphuric acid till the fumes of the acid are given off. The solution is diluted with water, allowed to settle, filtered, washed by decantation with water acidulated with sulphuric acid, and finally on the filter with dilute alcohol or water," and so forth.

These directions are inadequate, and it may be doubted whether either Prof. Rhead's or Prof. Sexton's students have ever been set to work without a fuller and more careful account of the precautions to be observed.

Among other blemishes, the omission of all reference to Mulder's neutral point in the Gay-Lussac method of estimating silver may be mentioned, and the importance of check assays in this method is not sufficiently insisted on.

However, all these faults do not prevent the book from being useful both as a supplement to oral laboratory teaching and as a book of reference to experienced assayers. It is divided into three parts, part i. being devoted to a brief description of laboratory appliances and general processes, part ii. to the assay of the more important metals as well as chlorine and sulphur, and part iii. to a short account of certain analyses which have to be made in practice in metallurgical works. Of these, part iii. is perhaps less satisfactory than the others, but, although it is far from complete, there is much useful information in it, and speaking generally, analytical chemists and assayers will not regret the addition of the volume to their bookshelves. T. K. R.

OUR BOOK SHELF.

The Climates and Baths of Great Britain. Vol. ii. Pp. xvi + 628. (London: Macmillan and Co., Ltd., 1902.) Price 12*s.* 6*d.* net.

THIS volume completes the work undertaken by the committee of the Royal Medical and Chirurgical Society of London in 1889. The general arrangement of the subject-matter is on the same plan as in vol. i., and in order to maintain this uniformity the meteorology of the same series of years (namely, 1880-1890) has been investigated.

The volume deals with London and Middlesex, the east coast, the midland counties, Lancashire, the lake district, Northumberland, North and South Wales, Ireland—including its mineral springs; and the whole of the work has been placed in the hands of contributors whose names are well known in the medical world. It should be added that seven excellent maps, showing areas, elevations, rainfalls and isothermals, are also incorporated.

The local information contained in this and in the former volume was mainly collected by means of circular letters sent to medical men practising at the various health resorts and bath-places, in which they were asked their opinion as to the prevalence of certain diseases; the influence of the climate upon patients sent there for the treatment of different diseases; the common causes of death and frequency of old age among residents; the system of drainage; the water supply; and the local climatological data. Where medicinal baths exist, inquiry was made as to what morbid conditions are treated with advantage by these baths, the ways in which the waters are employed, the diseased conditions contraindicating their use, and the time of the year advised for their application.

The chapter dealing with London and Middlesex is certainly one of the best. The writer, Dr. William Ewart, remarks that in London "everything is artificial," from the "made ground" upon which it is built to its water courses, some of which are turned away from their natural beds, and to the composition of its air, so much altered by smoke, London fogs and mists, that the meteorology of London is one *sui generis*. Dr. Ewart asks, why should life in London be, on the test of mortality, so much safer than in many other districts? This he considers to be partly explained by the relative dryness and warmth prevailing in the streets; and he concludes that, with all its faults, its climate is a protective one, with less exposure, greater warmth and less humidity than is the case in many other districts.

The work is undoubtedly a valuable one, and well repays the large amount of time and labour which must have been devoted to its compilation. It will be found alike serviceable for reference to medical practitioners and their patients, and also to medical officers of health and local sanitary authorities, who are so largely interested in the health of the communities under their charge. The only respect in which this useful work leaves something to be desired is that the information should be of a more definite character than that furnished with reference to the prevalence of disease in some of the localities dealt with.

Electric Wiring: a Primer for the Use of Wiremen and Students. By W. C. Clinton, B.Sc. Pp. viii + 179. (London: John Murray, 1902.) Price 1*s.* 6*d.*

ELECTRIC wiring is not a very suitable subject on which to write a primer. From the wireman's point of view it is a subject to be studied only by practical apprenticeship; from the engineer's it is a special branch of electrical work to be taken up at a time when primers are things of the past. Nor do we quite see the right of such a book to a place in Mr. Murray's "Home and School Library," which is intended (as an advertisement sets forth) for the general reader as well as for school use. The general reader does not want to know how to make joints, and the schoolboy would be far better employed learning the first principles of electricity instead of the elementary details of one of its practical applications. Apart from considerations such as these, it must be admitted that Mr. Clinton has done his work well and written an interesting little book. He deals with wiring for both electric light and electric bells, and as these between them involve the principles of electricity, magnetism and electrochemistry, he has said a few words about the theory of all three subjects, and has strengthened these by the addition of some worked examples of an elementary character. The theoretical parts are necessarily brief, the bulk of the book being devoted to descriptions of the practical

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